cimens derived from the Korallenkalk or white jura of Nattheim, Wurtemberg, and to be seen in the collection of Fossil Terebratulæ of the British Museum, so beautifully worked out by the indefatigable exertions of Messrs. Waterhouse and Woodward.

Terebratula Deslongchampsii, nob. Pl. XV. fig. 6 *a*, *b*.

Shell small, oval, subdepressed; dorsal valve much more convex than the ventral one; beak straight, truncated by a large foramen extending to the umbo of the ventral valve, partly surrounded by the substance of the beak, by a small portion of a disunited deltidium, and a part of the umbo. Valves closely covered by numerous strong, short, tubular spines or granulations, between which the punctuation is visible: this structure being the same as that observable on *all* the lias Spirifers yet discovered, gives to the shell a rough feel similar to that of *Ter. lima* (Def.), but from which it differs completely.

This remarkable little shell is placed provisionally among the *Terebratulæ*, as I consider a knowledge of the internal appendages essential before one can say positively to what genus an unknown species belongs, as judging solely from external characters one may often be led to place a shell in a very inappropriate genus. It has the beak, deltidium and foramen of *Waltonia* and *Terebratulina*, and, as can easily be seen, the internal apophysary system in both differs completely, so that it may perhaps belong to one of these genera. Length $3\frac{1}{2}$ lines, breadth 3 lines, depth $1\frac{1}{2}$ line.

Only four or five specimens of this little shell are known as yet in the collections; viz. one specimen was found by M. Tesson, two by M. Breville in the lias beds of Curcy, and one by myself at Vieux Pont, between Caen and Bayeux. It was however familiar to M. Deslongchamps some years back, who kindly forwarded me drawings he had made from M. Tesson's specimen. I take much pleasure in dedicating this species to M. Deslongchamps.

Pl. XV. fig. 6. nat. size of the species; 6 *a*, enlarged figures.

XXXIX.—*On some Inhabitants of the Freshwater Muscles.*

By C. Vogt*.

Since the interesting researches of M. Baër†, it is well known that the freshwater Muscles are infested by a number of Entozoa of extraordinary form: *Cercariæ*, *Bucephali*, tailed *Distomæ*, and numerous other Trematoda in the state of larvæ and

* Translated from the Annales des Sciences Naturelles, Oct. 1849.

† Nov. Act. Acad. Leopold. Carol. vol. xiii. Pars 2.

of perfect individuals, frequently swarm in the organs of these animals. During my stay at Giessen I undertook a series of researches on the embryology of the various animals which inhabit the freshwater muscles; these investigations were interrupted by the revolution of 1848. Having no opportunity of resuming them immediately, I consider it a duty to call the attention of naturalists to a field of investigation which promises a rich harvest. Embryologists especially will find in the freshwater muscles matter to satisfy them; for they present not only their own eggs and the larvæ of bivalves which hatch in their gills, but also eggs and embryos of Entozoa, of articulated and even vertebrated animals.

The eggs of the freshwater muscles pass into the gills in the beginning of May. I have not been able to observe the passage itself, but I have notwithstanding traced the development of the egg in the first stages of the embryogenic process. I have seen the division of the vitellus in all its phases, up to the formation of a globular embryo, which still wanted a shell. By comparing the eggs concealed in different parts of the gills, I convinced myself that the eggs placed near the anus were more advanced in this process than those which were in the anterior portion of the gills; the latter therefore appear to be filled from before backwards. The eggs, in the ovary, arrived at a certain stage of maturity, are always composed of a transparent envelope, and of a granular vitellus of a whitish, yellow or orange colour, in which is situated the Purkinjean vesicle. This vesicle is very large, entirely transparent, and always contains two small vesicles (germinative spots of Wagner), one of which sometimes presents a granular appearance. It is a general law, as regards the eggs of the Unios and Anodonts, that these spots are to the number of two in each egg.

The ovary and testicle are the habitual seat of those larvæ of Trematoda, which M. Baër has designated under the name of *Bucephalus polymorphus*. The figures which M. Baër has given of these singular animals are tolerably correct. They are formed of a distomoid body placed on two long rolled-up appendices which have a serpentine movement. These larvæ are developed in the long filiform intestines, which, under the microscope, exhibit now and then swellings, in which are lodged the *Bucephali*. The sexual organ affected by this dyscrasy resembles a mass of entangled white threads; I found one individual in about two hundred freshwater muscles, the ovary of which had the appearance of a fibrous schirrus macerated for some time. These threads are especially developed in January and February; and it is also in these months that the development of the *Bucephali* may be easily observed. In the swellings of the intestines, globules

formed of a finely granular substance occur; the globules lengthen, become elliptic; they send out prolongations at one of the extremities, at first very broad, which are not distinguishable by any peculiarity of their tissue from the body to which they are attached. But as they grow, they separate from the body by a groove, fill it with granulations, and finally become nearly filiform, coiling themselves up like horns. The body to which these appendages belong, grows in proportion, lengthens, takes the form of a Distoma, and finally casts off the appendices. This separation sometimes takes place under the eye of the observer; and what is especially remarkable is, that the primitive globule, which is thus transformed, does not present a cellular structure: neither nucleus nor envelope is observable; it is a simple globule of waxy consistence, which is easily flattened by the compressor.

The *Bucephali* are, as I have shown by the proportion in which they are found, rare in the environs of Giessen. More frequently, and especially in spring, the sexual organ of the freshwater muscles is found affected by another helminthic dyscrasy. The ovary is then coated here and there with small granules of a deep red-brown colour. These granules are cysts filled with eggs and larvæ, to which M. Baër has given the name of *Distoma duplicatum*. The body is that of a true *Distoma*, furnished with an appendix still longer than the body, and formed solely of large fibres folded in zigzag, and inclosed in a transparent sheath. I have found in a single cyst as many as ten larvæ coiled up, and surrounded by a score of eggs in different stages of development. The larvæ and eggs are of a deep orange colour.

Another guest as yet too little known is met with in summer in the viscous liquid surrounding the heart of these freshwater muscles: this is the *Aspidogaster conchicola* of M. Baër. Nearly one individual in a hundred is found affected with these curious Entozoa. The adult Aspidogasters are almost always filled with eggs, in which rolled-up embryos are easily distinguished: what most struck me in these embryos furnished with two suckers was the detection in them of an organ situated in the first third of the body, at the margin of the anterior sucker, closely resembling the organ of hearing in the larvæ of Mollusca. This organ is simple, placed on the median line of the body, and is formed of a transparent vesicle, containing a lithoïd body composed of two rounded and nearly equal halves. The general form of the embryos of the *Aspidogaster* differs much from that of the adults.

It is evident, from what we have stated, that it is easy to procure in the freshwater muscles the necessary materials for the investigation of the embryogenic history of a mollusk and of three species of Trematoda; but this is not all.

M. Baër, and after him M. Pfeiffer, have noticed an Acarus which dwells in the palleal cavity of the Naïades. M. Baër called this Acarus *Hydrachna concharum*. M. Pfeiffer, who was not then acquainted with M. Baër's investigations, gave it the name of *Limnochares Anodontæ*.

The eggs of this Acarus are arranged under the external lamella of the branchial lobes; they form granular masses of a whitish colour, which are very easily discerned through the thin membrane which covers them. It is sufficient to remove this membrane or tear it with a needle to lay bare the eggs, which are just large enough to be visible to the naked eye. The vitellus, composed of fatty globules, gives a whitish colour to these eggs, the envelope being perfectly transparent. I know no eggs of articulated animals which so readily admit of microscopical observation. The envelope is of a consistence sufficient to protect the embryo against a gentle pressure; so that it is easy to move the egg under the compressor in any desired direction without injuring the inclosed embryo; we may also, without much difficulty, succeed in removing this envelope by cautious pressure, and liberating the embryo without any disfiguration. The eggs are so numerous that there is no need to be sparing of them. A freshwater muscle is rarely opened in winter the gills of which do not contain hundreds of eggs in different stages of development, and it is always easy to compare the structure of the embryos with that of the young or adult animals, because the latter occur always in large number on the gills and on the internal surface of the mantle. The embryo carries the vitellus a long time after the hatching on the dorsal surface of the body; it comes out of the egg having only three pairs of legs, whereas the adult has four.

Lastly, I found, during the months of June and July, a great number of young fishes lodged in the gills of the freshwater muscles. The first time that I made this observation, I could scarcely believe my eyes, and at first I thought it was the effect of an extraordinary chance. But I was deceived; in a hundred freshwater muscles opened in the months mentioned, I found, at least in sixty, small fishes all belonging to the same species, at different degrees of development. I found as many as forty in a single freshwater muscle, the gills of which were then considerably enlarged. I rarely met with eggs; they were yellow, like the yolk of hens' eggs, of an oval form, and about 1 millimetre to $1\frac{1}{2}$ long. The embryos quit the eggs very early; the youngest that I have met with could not yet move, and were so little advanced, that the black pigment of the eyes had scarcely begun to be deposited. The largest fishes which I met with in the gills were 10 millimetres long; they swam with vivacity,

although still bearing the vitellary sac concealed in the abdomen.

The fishes' eggs are, without doubt, introduced by the respiratory current of the freshwater muscles. But their early exit from the egg, at a period when the embryos of other fishes still remain in the egg, as well as their whole manner of existence, seem to me to prove that the gills of the freshwater muscles are the habitual place of incubation of these embryos. They are all concealed there in the same fashion, with the head turned toward the free edge of the branchial lobes; they thus fill the elongated cavities between the two plates of a branchial lobe, and it is only necessary to cut the external membrane in order to set the embryos at liberty. It is then curious to follow the movements of the oldest. After making some turns in the vessel containing them, they return toward the gill, and eagerly attempt to penetrate into it. I have often seen them re-enter the respiratory canal, and conceal themselves again in a branchial cavity where they then kept quiet.

I have not been able with complete certainty to ascertain to what species of fish these little ones belong. The oldest which I have met with had not yet any generic character; they all still possessed the embryonic fin continuous around the posterior extremity of the body, and the ventral ones were altogether wanting. But as I know the eggs of nearly all the genera of fishes inhabiting our soft waters, I have reason to believe that these eggs are of the *Cottus Gobia*, Linn., a species common in our small rivers.

These embryos are remarkably distinguished from all those which I have hitherto observed; the vitellus is almost opake and of a yellow colour, which, under the microscope, appears of a deep brown. The vitellary sac has a very elongated form, and the young fish is lodged in a very deep depression of this enormous vitellary sac. The difficulty of observation which results from this disposition is further increased by two lateral swellings of the yellow mass, swellings which rise where the pectoral fins have to come out. The swellings of the vitellus enter indeed into the base itself of the pectoral fin in the more advanced embryos, and thus conceal all the anterior part of the body. To examine the heart and the branchial region of the embryo, the vitellary sac must be emptied, which soon causes the circulation to cease.

Embryonic researches among the inferior animals are often only rendered so difficult by the want of proper materials. I shall be happy if I have contributed to remove some of these difficulties, and I am sure that analogous researches on sea mollusks may lead to numerous discoveries of the same kind.